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EXAMINER	
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2621	19

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 09/654,939	**Applicant(s)** JO ET AL.	
	Examiner Brian P. Werner	**Art Unit** 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,9-11 and 18-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,9-11 and 18-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *14* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority Chain (Reiterated from Previous Actions)

1. The preset application (i.e., 09/654,939) is a divisional reissue application filed on December 22, 2000, claiming priority to reissue application number 09/638,796 filed on August 11, 2000, which is a reissue application of number 08/495,591 filed on November 3, 1995, patent number 5,793,897, which is a 371 of international application number PCT/KR94/00177 filed on December 16, 1994, which claims priority to Korean applications 93-28074 and 94-34497, filed on December 16, 1993 and December 15, 1994 respectively.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 24, 2004 has been entered. Claims 1-3, 9-11 and 18-23 are now pending.

Reissue Applications

RECAPTURE

3. Newly added claims 18-23 have been examined with respect to 35 U.S.C. 251, and found to be permissible. In order to clarify the record, a brief explanation shall follow.

I is clear from the prosecution history of the Patent file (i.e., the original prosecution) that a single mutually-agreed-upon action resulted in allowability. That is, following a telephone interview detailed in paper number 10 of the Patent file, the applicant filed amendment C canceling dependent claim 2 of the Patent file and incorporating all of its limitations to independent clam 1. That limitation reads as follows (referred to below as the "added subject matter"):

> ", wherein said selecting step has the selecting range of a plurality of variable-length coding tables having different patterns of a regular region and an escape region according to said intra/inter mode information of the currently processed block."

Following the amendment, the examiner allowed the application claims.

Now turning to the reissue claims, and specifically to reissue independent claims 18, 19 and 23, the applicant has retained a broader version of the added subject matter. For example, independent claim 18 recites selecting from a "plurality of variable-length coding tables", the tables comprising a table for "an alternating-current (AC) component of an intra mode that is different from a table

selectable for an inter mode". Independent claims 19 and 23 recite equivalent subject matter.

This is a broader version of the subject matter added to that Patent claim 1 which resulted in allowance. That is, reissue independent claim 18 recites selecting from a plurality of VLC tables that have "different" patterns for "intra" and "inter" mode information, which is a broader version of the added subject matter of patent claim 1. Thus, a recapture rejection is avoided (MPEP 1412.02).

DECLARATION

4. In accordance with 37 CFR 1.175(b)(1), a supplemental reissue oath/declaration under 37 CFR 1.175(b)(1) must be received before this reissue application can be allowed.

Claims 1-3, 9-11 and 18-23 are rejected as being based upon a defective reissue declaration under 35 U.S.C. 251. See 37 CFR 1.175. The nature of the defect is set forth above.

Receipt of an appropriate supplemental oath/declaration under 37 CFR 1.175(b)(1) will overcome this rejection under 35 U.S.C. 251. An example of acceptable language to be used in the supplemental oath/declaration is as follows:

> "Every error in the patent which was corrected in the present reissue application, and is not covered by a prior oath/declaration submitted in this application, arose without any deceptive intention on the part of the applicant."

Claim Objections

5. The following quotations of 37 CFR § 1.75(a) is the basis of objection:

> (a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

6. Claims 9-11 are objected to under 37 CFR § 1.75(a) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery. Specifically, claims 9-11 depend from cancelled base claims. These claims appear to be identical to dependent claims 20-22, and are thus addressed in the art rejection of these claims below.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kim (US 5,402,244 A) and Kaneko et al. (US 4,908,862 A), and further in combination with Okazaki et al. (US 5,982,437 A).

<u>The Kim Reference</u>

Regarding claims 1-3, **(Difference between Kim and claim 1 are highlighted in bold below for the sake of clarity)**, Kim discloses an adaptive variable-length coding method ("VLC coder" at column 3, line 14) whereby quantized orthogonal transform coefficients ("DCT" and "quantization circuit is adapted to quantize the DCT coefficients" at column 3, line 56) are scanned in a zig-zag pattern ("zig-zag scanning" at column 4, line 15), are modified into run, level data ("run-level coding block" at column 4, line 15) and then are variable-length coded ("variable length coding block" at column 4, line 16) in a coding system for image data ("video" at column 3, line 18), the method comprising:

setting a plurality of variable-length coding tables having different patterns ("4 variable length coding lookup tables" at column 4, line 34) **of a regular and an escape region (Construction Note:** It is noted that "regular" and "escape" regions are described by applicant with respect to figure 4, where a regular region contains low frequency coefficients and an escape region contains high frequency coefficients. In the absence of any claimed elements further defining the nature of these regions, the examiner shall interpret regular and escape regions in this manner) according to statistical characteristics of said run, level data (Kim sets the plurality of VLC tables based on the "statistical distribution of amplitude levels" within the images at column 5, line 12 and elsewhere);

selecting on of the plurality of tables (figure 4) according to **inter/intra mode information of the currently processed block, zigzag scanning position** and quantization step size ("and which can be selectively addressed by run-level code words" where "the selection of the variable length coding lookup

tables in the VLC coding process is achieved by referencing the QP's used in the DCT coefficient quantization process" at column 4, lines 37-40; the "QP's" are the quantization parameters that control the quantization step size, for example, "Qp=2 to 3, Qp=4to 7, Qp = 8-15 and Qp = 16 to 28" at column 5, line 1); and

variable-length coding the orthogonal transform coefficients according to the selected variable-length coding table (figure 2B, numerals 43 and 44), wherein the selecting step has a selecting range of a plurality of variable-length coding tables (as stated above, 4 tables are provided from which to select; see figure 4) **having different patterns of a regular region and an escape region according to said inter/intra mode information of the currently processed block.**

<u>Differences</u>

Kim does not teach:

A: The variable-length coding tables having different patterns **of a regular and an escape region; and**

B: selecting one of the plurality of tables according to **inter/intra mode information of the currently processed block; and**

C: selecting one of the plurality of tables according to **zigzag scanning position.**

<u>The Kaneko Reference – Teaches Differences A and C</u>

Kaneko disclose a variable length image coding system (figure 10), comprising a plurality of variable length coding tables (figure 10, numeral 45) having different patterns of a regular and an escape region (as depicted in figure 12; there are five coding tables having different patterns of regular and escape regions; e.g., the first code set of figure 1 pertains to a regular regions and has the pattern of "1s" depicted in figure 12; the fifth code set of figure 10 pertains to an escape region and has the patter of "5s" depicted in figure 12; Kaneko states, "the distribution of the quantized signals for the low frequency components becomes dense in comparison with the distribution of the quantized signals for the high frequency components" at column 12, line 4, and "this means that the quantized signals for the low and the high frequency components are preferably encoded in accordance with different code sets" at column 12, line 12; thus, given that the patterns are different for the low and high frequency regular and escape regions respectively, the claimed limitations are met; *NOTE that the above limitations are also met by Kaneko by the embodiment of figure 13, where the first code set pertains to the regular regions and the second code set pertains to an escape region*).

Kaneko selects one of the plurality of tables according to zigzag scanning position as depicted in figures 11 and 12 (i.e., each one of tables 46-50 in figure 10 correspond to scanning patterns 1-5 as depicted in figure 12, and patterns 1-5 of figure 12 correspond to scanning position as depicted in figure 11; thus, as the

zig-zag scanning of figure 11 progresses, different zones of figure 12 are traversed and thus different tables are selected).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the code table Kim by providing, for each table, different patterns for regular and escape regions as taught by Kaneko, in order to provide "high efficiency of encoding" where "the low and the high frequency components can be encoded into short length codes, respectively" (Kaneko, column 12, lines 8-12).

The Okazaki Reference – Teaches Difference B

Okazaki discloses a system in the same field of variable length coding an image signal, comprising a VLC encoder (figure 5, numeral 23A), and a plurality of VLC tables comprising a table selectable for an intra mode (figure 5, numeral 23C and detailed in figure 14) and another table selectable for an inter mode (figure 5, numeral 23D and detailed in figure 12). Okazaki selects one of the plurality of tables (figure 5, numeral 23B) according to inter/intra mode information of the currently processed block (figure 5, signal S3).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the VLC encoder of the Kim and Kaneko combination to include different intra and inter mode tables as taught by Okazaki, in order to "improve the coding efficiency ... depending upon generation frequency" (Okazaki, column 8, lines 1-5) because "intra frame coded quantized data and inter frame coded quantized data are different from each other in the

frequency distributions of run lengths and data levels" (Okazaki, column 8, lines 8-10), which "makes it possible to further decrease the bit length of transformed and thereafter outputted picture data even though it is the quantized data coded by any coding system, compared with the existing case in which variable length coding is performed by using a VLC table for inter frame coding" (Okazaki, column 10, lines 58-65).

Stated another way, "it is possible to further improve the variable length coding efficiency by variable length coding input data with a variable length coding table selected in accordance with the coding efficiency among a plurality of variable length coding tables prepared compared with the case for performing variable length coding with only one variable length coding table" (Okazaki, column 4, lines 8-14).

Dependent claims 2 and 3 are already met by the Kim, Kaneko and Okazaki combination as described above.

9. Claims 18, 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A) and Okazaki et al. (US 5,982,437 A).

Regarding independent claims 18, 19 and 23, Kato discloses an adaptive variable length coding method

(e.g., figures 7, 13 and 17 best exemplify the encoding method of Kato; Figure 7 is an overall block diagram, figure 13 is a more detailed block diagram

of the overall system, and figure 17 is a detailed diagram of the variable length coding VLC according to block 64 of figure 7, and block 126 of figure 13)

in which quantized orthogonal transform coefficients

(i.e., "quantized DCT coefficients" at column 13, line 3; looking at figure 13, a DCT is performed at block 114, and the coefficients of the DCT are quantized at block 115; these coefficients are represented in figure 17 at numeral 700)

are scanned in a predetermined pattern

(i.e., "scan ... in a zigzag manner" at column 13, line 4), and are then variable length coded *(i.e., "variable length code" at column 6, line 10; looking at figure 13, variable length coding takes place at block 126; figure 17 depicts the details of the variable length coding)*

in a coding system for image data

("raw picture" at column 6, line 25),

comprising the steps of:

setting a plurality of variable length coding tables

(in figure 17, more than four tables are set; that is, block 704 has Huffman tables for DC and AC coefficients and block 707 has at least the four tables depicted in figures 9B, 9C, 21A and 21B; that is, not only does block 706 rely

upon tables of figures 9B-9C, but it may also access the tables of figures 21A and 21B when a different quantization precision is required, as described at column 28, lines 41-56; Thus, a plurality of VLC coding tables are set as follows: block 704 has a table, and block 705 has at least four tables corresponding to figures 9B, 9C, 21A and 21B;

NOTE however that there are other ways the Kato reference anticipates this limitation; for example, table modifier 706 modifies the tables of 707 and thus sets a different set of tables; Kato states that "the ranges of the tables can be dynamically adapted to the encoding precision required" at column 4, line 49; in addition, Kato states that the "code tables ... are modified in accordance with results of statistical observation of input signals" at column 8, line 25; this is stated again by Kato at column 28, lines 41-55; further);

selecting one of the plurality of variable length coding tables

(e.g., either 9B, 9C, 21A or 21B; e.g., table 9B or 21A is selected by the modifier 706 if flag S702 is set, corresponding to Y data or table 9C or 21B is selected if flags 703 or 704 are set corresponding to Cb or Cr data; this is described at column 22, lines 7-15)

according to intra/inter mode information

(e.g., in figure 17, block 709 sets switch 710 to the "B" position for "intra" mode image information and "A" for inter mode image information; when the switch is in the "A" position, the Huffman tables of block 704 are utilized for

coding; when the switch is in the "B" position, the coding tables of block 705 are utilized for coding; then, according to the Y or Cb and Cr flags as described above, either table 9B/21A or 9C/21B are selected)

scanning position

(e.g., block 703 [the DC/AC Separator] selects block 704 for AC coefficients and block 705 for DC coefficients; when block 705 is selected corresponding to DC coefficients, then according to the Y or Cb and Cr flags as described above, either table 9B/21A or 9C/21B are selected; given that AC and DC coefficients have different scanning positions [i.e., the dc coefficient is scanned first, followed by the ac coefficients in a zigzag manner], the claim limitation is met),

and quantization step size

(i.e., "modifier 706 functions to control the storage 707, based on the intra_dc_precision code S26; code 26 represents quantization step size; that is, "the signal CTL represents, the required precision of 8, 9, 10 or 11 quantized bits" at column 8, line 60, and "S26 corresponds to the CTL signal" at column 11, line 10; if the precision required is to be 8-11 bits, one of tables 9B or 9C are selected; if the precision is less than that, then one of tables 21A or 21B are supplied; see "the VLC process ... is based on data from the tables shown in FIG. 21A and 21B instead of FIG. 9B and 9C" at column 28, line 50),

where the selecting step has the selecting range of a plurality of variable length coding tables

(as stated above, a plurality of coding tables are available for selection); and

wherein said plurality of variable-length coding tables comprise:

a table selectable for a DC component of said intra mode (figure 17, numeral 705 encodes DC coefficients according to a table stored in 707); and

said table for said DC component (figure 17, numeral 707, which relies upon tables 9A-9C as described at column 21, line 41) comprising variable-length codes (i.e., as depicted in figures 9A) further selectable according to said DC component (each of the codes depicted in figure 9A are selectable according to the size of the DC component) that has been quantized by a quantization step size (as depicted in figure 13, the DC components are encoded at numeral 126 after quantization at numeral 115); and

and variable length coding said quantized orthogonal transform coefficients according to said selected variable length coding table

(figure 17, the coded data is present at numeral 732).

Kato does not teach a table selectable for an AC component of an intra mode (figure 17, numeral 704) that is different from a table selectable for an inter mode.

Kato's intra mode AC coefficients and Inter mode coefficients are encoded by the same encoder, at figure 17, numeral 704. That is, Kato's inter mode coefficients are encoded using the VLC of numeral 704, and Kato's intra mode AC coefficients (i.e., signal S707) are encoded by that same encoder.

Okazaki discloses a system in the same field of variable length coding an image signal, comprising a VLC encoder (figure 5, numeral 23A), and a plurality of VLC tables comprising a table selectable for an AC component of an intra mode (figure 5, numeral 23C and detailed in figure 14) that is different from a table selectable for an inter mode (figure 5, numeral 23D and detailed in figure 12).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the VLC encoder of Kato at figure 17, numeral 704, to include different intra and inter mode tables as taught by Okazaki, in order to "improve the coding efficiency ... depending upon generation frequency" (Okazaki, column 8, lines 1-5) because "intra frame coded quantized data and inter frame coded quantized data are different from each other in the frequency distributions of run lengths and data levels" (Okazaki, column 8, lines 8-10), which "makes it possible to further decrease the bit length of transformed and thereafter outputted picture data even though it is the quantized data coded by any coding system, compared with the existing case in which variable length coding is performed by using a VLC table for inter frame coding" (Okazaki, column 10, lines 58-65).

Stated another way, "it is possible to further improve the variable length coding efficiency by variable length coding input data with a variable length coding table selected in accordance with the coding efficiency among a plurality of variable length coding tables prepared compared with the case for performing variable length coding with only one variable length coding table" (Okazaki, column 4, lines 8-14). Thus, given that Kato's VLC at figure 17, block 704 must encode both inter and intra mode information, by providing Kato with a plurality of variable length coding tables at block 704 for both intra and inter mode information as taught by Okazaki, efficiency can be improved.

10. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A) and Okazaki et al. (US 5,982,437 A) as applied to claim 19 above, and further in combination with Kaneko et al. (US 4,908,862 A).

Regarding claim 20, Kato does not disclose the variable length coding tables as having different patterns of a regular and an escape region.

It is noted that "regular" and "escape" regions are described by applicant with respect to figure 4, where a regular region contains low frequency coefficients and an escape region contains high frequency coefficients. In the absence of any claimed elements further defining the nature of these regions, the examiner shall interpret regular and escape regions in this manner.

Kaneko disclose a variable length image coding system (figure 10), comprising a plurality of variable length coding tables (figure 10, numeral 45)

having different patterns of a regular and an escape region (as depicted in figure 12; there are five coding tables having different patterns of regular and escape regions; e.g., the first code set of figure 1 pertains to a regular regions and has the pattern of "1s" depicted in figure 12; the fifth code set of figure 10 pertains to an escape region and has the patter of "5s" depicted in figure 12; Kaneko states, "the distribution of the quantized signals for the low frequency components becomes dense in comparison with the distribution of the quantized signals for the high frequency components" at column 12, line 4, and "this means that the quantized signals for the low and the high frequency components are preferably encoded in accordance with different code sets" at column 12, line 12; thus, given that the patterns are different for the low and high frequency regular and escape regions respectively, the claimed limitations are met; *NOTE that the above limitations are also met by Kaneko by the embodiment of figure 13, where the first code set pertains to the regular regions and the second code set pertains to an escape region*).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the code sets (i.e., tables) of the Kato and Okazaki combination, by providing different patterns for regular and escape regions as taught by Kaneko, in order to provide "high efficiency of encoding" where "the low and the high frequency components can be encoded into short length codes, respectively" (Kaneko, column 12, lines 8-12).

Regarding claim 21, which depends from claim 20, the limitations therein are met by Kato. That is, Kato selects the variable length coding table in

accordance with said scanning position and quantization step size as described above, within the range determined in accordance with said intra/inter mode information (figure 17, numeral 709; "the ranges of the tables can be dynamically adapted to the encoding precision required for the portion of the video signal being encoded' at column 4, line 49; the encoding precision of the "intra" picture data is encoded with more precision that the inter picture data).

11. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A), Okazaki et al. (US 5,982,437 A) and Kaneko et al. (US 4,908,862 A) as applied to claim 20 above, and further in combination with Jung (UK 2 267 410 A).

The Kato, Okazaki and Kaneko combination does not teach the data of the escape region of said variable length coding table selected in said variable length coding step being "coded into data having variable run length and level length".

Jung disclose a variable length image coding system (figure 5), comprising coding the data of an escape region (figure 4) into data having variable run length and level length ("the escape sequence, which has coded data from the escape region, comprises an escape code ESC, run, level and sign data" at page 9, line 11; the run and level data are variable as described on page 8; i.e., see "value ranging from" and "level varies" at page 8, lines 10-11).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to code the data of the Kato, Okazaki and Kaneko

combination escape region into data having variable run length and level length as taught by Jung, in order to reduce the number of bits, and thus provide maximum data compression, of the frequency coefficients in the "escape region" where the frequency of occurrence of data is low (i.e., page 8, bottom paragraph – page 9, top paragraph). That is, most if not all of the frequency coefficients in the escape region are zeros. Therefore, using the run, length codes reduces the amount of data required to represent these redundant coefficients by simply allocating them as a string of the same coefficients, rather than individually encoding the coefficients.

12. Claims 18, 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A) and Okazaki et al. (US 5,982,437 A), and further in combination with Kim (US 5,402,244 A).

The details of the Kato and Okazaki combination as applied to claims 18, 19 and 23 above are incorporated herein by reference.

Even if Kato did not disclose the selection of one of said VLC tables based on "quantization step size" as argued by the applicant (i.e., In the May 24, 2004 response, at page 10), Kim teaches this technique.

Kim discloses a system for variable-length coding a video signal (figure 1), comprising setting a plurality of variable length coding tables ("4 variable length coding lookup tables" at column 4, line 34), and selecting one of the tables based on quantization step size ("and which can be selectively addressed by run-level code words" where "the selection of the variable length coding lookup tables in

the VLC coding process is achieved by referencing the QP's used in the DCT coefficient quantization process" at column 4, lines 37-40; the "QP's" are the quantization parameters that control the quantization step size, for example, "Qp=2 to 3, Qp=4to 7, Qp = 8-15 and Qp = 16 to 28" at column 5, line 1). Kim sets the plurality of VLC tables based on the "statistical distribution of amplitude levels" within the images at column 5, line 12 and elsewhere).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to provide, for each of the VLC tables disclosed by Kato, a plurality of VLC tables as taught by Kim and selectable based on quantization step size as taught by Kim, thereby achieving "a highly efficient bit rate reduction through the use of a number of lookup tables reflecting the statistical local variations caused by the use of different quantization parameters" (Kim, column 6, lines 10-14).

It is noted that Kato suggests that the "data in the tables ... does not have to be fixed" and instead, "it may be variables that result in an optimum post-encoding compression factor" where "the values of the variables are determined from statistical observation of the input picture signal" at column 28, lines 51-55, and Kim provides one method of fulfilling this suggestion.

13. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A), Okazaki et al. (US 5,982,437 A) and Kim (US 5,402,244 A), and further in combination with Kaneko et al. (US 4,908,862 A).

Regarding claim 20, Kato does not disclose the variable length coding tables as having different patterns of a regular and an escape region.

It is noted that "regular" and "escape" regions are described by applicant with respect to figure 4, where a regular region contains low frequency coefficients and an escape region contains high frequency coefficients. In the absence of any claimed elements further defining the nature of these regions, the examiner shall interpret regular and escape regions in this manner.

Kaneko disclose a variable length image coding system (figure 10), comprising a plurality of variable length coding tables (figure 10, numeral 45) having different patterns of a regular and an escape region (as depicted in figure 12; there are five coding tables having different patterns of regular and escape regions; e.g., the first code set of figure 1 pertains to a regular regions and has the pattern of "1s" depicted in figure 12; the fifth code set of figure 10 pertains to an escape region and has the patter of "5s" depicted in figure 12; Kaneko states, "the distribution of the quantized signals for the low frequency components becomes dense in comparison with the distribution of the quantized signals for the high frequency components" at column 12, line 4, and "this means that the quantized signals for the low and the high frequency components are preferably encoded in accordance with different code sets" at column 12, line 12; thus,

given that the patterns are different for the low and high frequency regular and escape regions respectively, the claimed limitations are met; *NOTE that the above limitations are also met by Kaneko by the embodiment of figure 13, where the first code set pertains to the regular regions and the second code set pertains to an escape region*).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the code sets (i.e., tables) of the Kato, Okazaki and Kim combination, by providing different patterns for regular and escape regions as taught by Kaneko, in order to provide "high efficiency of encoding" where "the low and the high frequency components can be encoded into short length codes, respectively" (Kaneko, column 12, lines 8-12).

Regarding claim 21, which depends from claim 20, the limitations therein are met by Kato. That is, Kato selects the variable length coding table in accordance with said scanning position and quantization step size as described above, within the range determined in accordance with said intra/inter mode information (figure 17, numeral 709; "the ranges of the tables can be dynamically adapted to the encoding precision required for the portion of the video signal being encoded' at column 4, line 49; the encoding precision of the "intra" picture data is encoded with more precision that the inter picture data).

14. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kato (US 5,559,557 A), Okazaki et al. (US 5,982,437 A) and

Kim (US 5,402,244 A) and Kaneko et al. (US 4,908,862 A) as applied to claim 20 above, and further in combination with Jung (UK 2 267 410 A).

The Kato, Okazaki, Kim and Kaneko combination does not teach the data of the escape region of said variable length coding table selected in said variable length coding step being "coded into data having variable run length and level length".

Jung disclose a variable length image coding system (figure 5), comprising coding the data of an escape region (figure 4) into data having variable run length and level length ("the escape sequence, which has coded data from the escape region, comprises an escape code ESC, run, level and sign data" at page 9, line 11; the run and level data are variable as described on page 8; i.e., see "value ranging from" and "level varies" at page 8, lines 10-11).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to code the data of the Kato, Okazaki, Kim and Kaneko combination escape region into data having variable run length and level length as taught by Jung, in order to reduce the number of bits, and thus provide maximum data compression, of the frequency coefficients in the "escape region" where the frequency of occurrence of data is low (i.e., page 8, bottom paragraph – page 9, top paragraph). That is, most if not all of the frequency coefficients in the escape region are zeros. Therefore, using the run, length codes reduces the amount of data required to represent these redundant coefficients by simply allocating them as a string of the same coefficients, rather than individually encoding the coefficients.

Response to Arguments

15. Applicant's arguments with respect to claims 18, 19 and 23 have been considered but are moot in view of the new ground(s) of rejection advanced above. In addition, upon consideration of the new art, a rejection of previous allowed claims 1-3 is now advanced as well.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Werner whose telephone number is 703-306-3037. The examiner can normally be reached on M-F, 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Brian Werner
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Art Unit 2621
August 13, 2004

BRIAN WERNER
PRIMARY EXAMINER